REMARKS

I. Status of the Claims and the Rejections

Claims 19-22 and 27-34 were rejected for alleged obviousness under 35 U.S.C. § 103 based on Plattner U.S. Patent No. 6,658,881 ("Plattner") in view of Chiang U.S. Patent No. 6,481,228 ("Chiang"). Applicants respectfully traverse these rejections.

However, applicants have amended independent claim 19 to further clarify the subject matter regarded as patentable. Applicants have also amended claims 27, 29, 30 and 32 and canceled claims 20, 33 and 34. In view of these amendments and the following remarks, applicants respectfully request reconsideration and allowance.

II. Claims 19, 21, 22 and 27-32 are Not Obvious

A. The Claims

Independent claim 19 is directed to an aircraft having a cooling device for expelling heat from a heat source located in the interior of said aircraft to a heat sink. The cooling device includes a piping system including a closed pipe having a first end section defining a heat intake section thermally coupled to the heat source and second end section defining a heat output section thermally coupled to the heat sink. The piping system also includes a conveyance section located between the first and second end sections and "composed of only one passageway from the first end section to the second end section." The piping system is filled with a heat conveyance medium that changes phase from liquid to gas in the heat intake section, and from gas to liquid in the heat output section. The liquid phase heat conveyance medium and the gaseous phase heat conveyance medium flow in opposing directions in the passageway of the conveyance section. The cooling device of claim 19 also includes a heat exchanger at the heat intake section, a ventilator controlling the transfer of heat at the heat

exchanger, a temperature sensor at the heat source, a regulator valve controlling the quantity of heat conveyance medium flowing in the piping system, and a regulation device.

Claims 21, 22 and 28 depend from independent claim 19 and recite additional features of the cooling device. For example, claim 22 further recites means for controlling the flow of the heat conveyance medium between the heat intake section and the heat output section.

Independent claim 27 is also directed to an aircraft having a cooling device for expelling heat from a heat source to a heat sink. The cooling device includes a piping system including a heat intake section coupled with the heat source, a heat output section coupled with the heat sink, and a heat conveyance medium flowing in the piping system and changing phase from gaseous to liquid and back to gaseous. The cooling device also includes the heat exchanger, the ventilator, and the temperature sensor previously described for claim 19. Claim 27 further recites "a cold storage unit provided between the heat source and the heat sink, the cold storage unit collecting cooled liquid phase heat conveyance medium for use when cooling requirements are increased, such as when the aircraft is on the ground."

Claims 29-31 depend from independent claim 27 and recite additional features of the cooling device. Claim 30 further recites that the aircraft includes a second piping system with a heat intake section and a heat output section, "whereby the cold storage unit is located in a secondary closed circuit defined by the second piping system."

Independent claim 32 recites a method for the discharge of heat from a heat source located in an aircraft to a heat sink. The method includes causing heat transfer at the heat intake section with a heat exchanger, controlling that heat transfer with a ventilator, and controlling a quantity of heat conveyance medium flowing to and from the heat exchanger with a regulator valve. The method also includes "storing cooled liquid phase heat conveyance medium in the cold storage unit while the aircraft is flying; and releasing stored liquid phase heat

conveyance medium from the cold storage unit to the heat source when the aircraft has an increased cooling requirement."

B. The Deficiencies of the Cited Prior Art

Plattner discloses an air conditioning system (14) in an aircraft. As shown in FIG. 1, the air conditioning system includes a closed pipe circuit connected a condenser (12), a receiver (18), an expansion valve (20), an evaporator (22), and a compressor (24) in series. The condenser is configured to be mounted along the outer surface of the aircraft and receives outside air for cooling and condensing a refrigerant in the closed pipe circuit. The evaporator circulates air from the cabin of the aircraft to heat and evaporate the refrigerant in the closed pipe circuit. The Office Action states that the condenser of Plattner is the "heat output section" of the claims and the evaporator is the claimed "heat intake section." The Office Action also states that Plattner fails to teach the ventilator, temperature sensor, regulator valve, and regulation device of the independent claims. Nonetheless, the Office Action cites Chiang for these missing elements.

Chiang is directed to an air-conditioning unit for a room partition panel. As shown in FIG. 23, the partition panel (10) includes an air inlet (13) adjacent to a blower (40) for producing flow in the panel and a temperature sensor (41). The panel also includes an air outlet (12) adjacent to a heat exchanger (30). The heat exchanger heats or cools the air flowing through the panel via heat transfer with a supply of water traveling through the piping of the heat exchanger from a supplying duct (20) to a returning duct (21). A controller (42) configured to control the blower (40) and a valve (38) in the supplying duct (20) is mounted on the partition panel. The Office Action states that it would have been obvious to use the heat exchanger, blower, temperature sensor, valve, and controller of Chiang with the evaporator of Plattner to arrive at the claimed invention. Applicants disagree. The purported combination of Plattner and

Chiang is improper as to all of the rejected claims, and is particularly deficient with respect to several of the claims, as explained below.

As a preliminary matter, it is unclear why one of ordinary skill in the art would combine Plattner and Chiang. Plattner is directed to an air conditioning system in an aircraft for cooling a cabin or an avionics bay with a closed-loop refrigerant circuit. By contrast, Chiang discloses a room partition panel for providing localized personal air-conditioning to one person in a larger room. The Chiang refrigerant system is not a closed loop because the refrigerant is separately supplied from an inlet port (201) and discharged through an outlet port (211) of the partition panel. In this regard, Chiang does not address the problems of a closed-loop refrigerant system for conditioning an entire space. One of ordinary skill in the art would not turn to Chiang in any manner to modify the system disclosed in Plattner.

Furthermore, the proposed combination would likely be inoperable because the blower and other components of the Chiang partition panel are not operable to cool or heat an entire space, as required by the Plattner air conditioning system. For at least these reasons, the combination of Plattner and Chiang is improper, and the Office Action fails to make a *prima facie* case of obviousness as to any of the claims.

Even if Plattner and Chiang were combinable, the resulting system would remain deficient. With reference to independent claim 19, the claimed piping system includes a closed pipe having first and second end sections connected by a conveyance section composed of only one passageway from the first end section to the second end section. To this end, liquid phase heat conveyance medium flows in the same passageway as the gaseous phase heat conveyance medium, albeit in opposing directions. By contrast, the closed pipe circuit of Plattner includes a first pipe passageway extending from the evaporator to the condenser through the compressor, and a second pipe passageway extending from the condenser to the evaporator through the

receiver (*see* FIG. 1). The refrigerant circuit of Chiang also includes two fluid passageways: the supplying duct and the returning duct. Thus, neither of the cited references includes only one passageway between a heat intake section and a heat output section, and the gaseous-phase and liquid-phase refrigerants of both references do not flow together in the same passageway. For at least these reasons, the purported combination of Plattner and Chiang is deficient with respect to claim 19.

Consequently, claim 19 is allowable over the cited references. Each of dependent claims 21, 22 and 28 depends from claim 19 and includes one or more additional features in combination with the features of claim 19. For substantially the same reasons set forth above with respect to claim 19, and further because the cited prior art fails to teach or suggest the subject matter recited in the claims, applicants respectfully submit that each of claims 21, 22 and 28 is also patentable. Applicants respectfully request that the rejection of claims 19, 21, 22 and 28 be withdrawn, and that these claims be allowed.

With reference to claim 27, the Office Action states that the receiver/dryer (18) of Plattner is a cold storage unit as recited in the claim. More specifically, the Office Action quotes a passage of Plattner that states "receiver/dryer 18 stores the liquid refrigerant" and argues that the stored refrigerant would be capable of use when cooling requirements are increased. In the cited passage, Platter goes on to explain that the receiver/dryer also "removes moisture from the liquid refrigerant, and filters foreign particles from the liquid refrigerant as the refrigerant circulates." Col. 2, lines 54-56.

One of ordinary skill in the art would understand that the receiver/dryer disclosed in Plattner is a well-known element that acts as a buffer and filter for a cooling medium in a refrigerant circuit. The so-called "storage" capacity of the receiver/dryer in Plattner is minimal and is only used in the separation of liquid phase refrigerant and gaseous phase refrigerant that

occurs within the receiver/dryer. As such, the "storage" is completely non-analogous to a cold storage unit that acts as a reservoir for storing significant amounts of cooled heat conveyance medium for use when cooling requirements are increased. Furthermore, one of ordinary skill in the art would clearly understand that the minimal amount of liquid phase refrigerant in the receiver/dryer of Plattner could not be used up when cooling requirements are increased, or else the receiver/dryer would become totally inoperable.

For at least these reasons, claim 27 is allowable over the cited references. Each of dependent claims 29-31 depends from claim 27 and includes one or more additional features in combination with the features of claim 27. For substantially the same reasons set forth above with respect to claim 27, and further because the cited prior art fails to teach or suggest the subject matter recited in the claims, applicants respectfully submit that each of claims 29-31 is also patentable. Applicants respectfully request that the rejection of claims 27 and 29-31 be withdrawn, and that these claims be allowed.

Additionally, claim 30 further recites a second piping system thermally coupled with the heat source and the heat sink to provide a secondary closed circuit for the cold storage unit. By contrast, Plattner includes the receiver/dryer (i.e., the alleged "cold storage unit") in the same piping system as the condenser and evaporator. *See* FIG. 1. As explained above, the receiver/dryer serves multiple functions such as filtering and buffering the liquid refrigerant in the piping of Plattner, so the receiver/dryer must be included in the primary cooling circuit with the evaporator and the condenser. Consequently, Plattner fails to disclose a second piping system for the cold storage unit, and it would not have been obvious to move the receiver/dryer to a separate piping system. Chiang is also completely silent about a second piping system and thus fails to overcome the deficiencies of Plattner as to claim 30. For at least these additional

reasons, claim 30 is allowable over the cited art and applicants respectfully request that the rejection of claim 30 be withdrawn.

With reference to claim 32, the method includes storing cooled liquid phase heat conveyance medium in the cold storage unit and then releasing stored liquid phase heat conveyance medium from the cold storage unit to the heat source when the aircraft has an increased cooling requirement. Again, the Office Action states that it would have been obvious to release stored refrigerant from the receiver/dryer of Plattner when the cooling requirement is increased. Office Action, page 6. As explained above, the receiver/dryer disclosed in Plattner is well known in the art and understood to only store a minimal amount of liquid refrigerant necessary to enable separation of liquid and gaseous refrigerant. Consequently, the receiver/dryer of Plattner cannot release this stored liquid refrigerant to increase the cooling capacity of the cooling system without totally undermining the operation of the receiver/dryer. One of ordinary skill would not operate the receiver/dryer in such a manner so that it fails for its intended purpose (i.e., buffering and filtering the refrigerant).

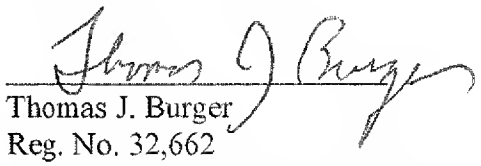
For at least these reasons, claim 32 is allowable over the cited references. Applicants respectfully request that the rejection of claim 32 be withdrawn, and the claim allowed.

III. Conclusion

Based on the amendments to the claims and these remarks, applicants respectfully assert that all present claims are in condition for allowance, and respectfully requests an allowance without further delay.

Applicants believe that no fee is due for this filing. But if the USPTO disagrees, please consider this as an authorization to charge Deposit Account 23-3000.

Respectfully submitted,



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